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## *EDITORIAL*

### THE LAW AND VETERINARY SURGEONS

All things, be they celestial or terrestial, animate or inert, follow a plan and their course and destiny are arranged according to the invincible rule of nature. This is the basic guiding force to which all must conform. Nature can be kind and gentle and benevolent and she dispenses harmony so that all her lieges, who act according to her commands, can pursue their destined course in comfort and tranquillity. On the other hand if her laws are transgressed or cast aside she can be cold and stern and enforce great retribution apparently without compassion or regret. When man first emerged from the primeval state and acquired the grace of sentiency he lived in the family or tribal fashion. This adoption of a communal type of life demanded that some rules of conduct should be superimposed on the stern regimen of nature, if men were to live in amity and advance their state. This was how man-made temporal law was born. No doubt in the first instance the relationship between the members of a family or tribe was regulated according to some simple precept or code which was specific to their own people and terrain. One can find examples of similar rules of conduct or tribal law in vogue at the present time amongst the primitive people who dwell in some parts of the world. Man advanced to his prime place amongst the animals because, by good fortune, he was allowed to develop his brain for the purpose of thought and reason. When this occurred his supremacy over the beasts was assured. He was no longer an automaton responding reflexly and avidly to the needs of his stomach, the urge of his senses, and environment. He began to observe and try to decipher the purpose of the changes in nature which occurred around him. Soon he began to appreciate that all natural things followed a prescribed plan or course and doubtless he was thrilled by the wonders thereof. No doubt he thought that his own life might be more pleasant if he copied nature and followed a plan or a set of rules which might regulate his own life and the conduct of his affairs and his contacts with his neighbours. This was the birth of man made laws. The basic principles of those laws resemble in many ways a theological doctrine. They are both codes of conduct, the latter governs the spiritual and ethical aspects of life and the former regulates secular conduct.

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As civilisation advanced and man became more expert in technical skill the individual could not continue to provide conveniently for all his requirements and be a "Jack of all trades". A considerable degree of specialisation in the various arts and crafts developed and soon became a necessity. This led to the establishment of standards and tokens of value as a means of exchange. The method of barter sufficed for many generations and then the monetary system was evolved and in its wake came more and more intercourse and trade. These events made life easier and more secure but those benefits were bought only at a price. The way of life became more complicated and there was an increase in men's dependence one upon the other.

Life under the new conditions had to be governed by new standards. Broadly these fell into two categories. There were ethical standards which developed from spiritual conceptions of what was right and wrong and their rigidity varied according to theological belief and training. Rules had to be delineated to deal also with the ordinary affairs of life which could be classified as of a temporal rather than of a spiritual nature. The latter became the legal code. The law in Britain is not founded on a rigid set code or constitution. In spite of its many ramifications, it is founded basically on the spiritual or ethical conception of what is right and what is wrong, what is just and what is unjust and above all what should be the manner of conduct of a reasonable man. When a country is ruled under the mandate of a written constitution the spirit of compromise is often in default and difficulties can arise. What might be acceptable and just and reasonable for one generation may not suffice for succeeding ones. In the absence of a written constitution the rights and wrongs between men can be solved only by taking note of previous record and experience. Modifications in interpretation can be made by considering previous findings and to some degree action can be orientated according to prevailing circumstances.

As the arts and crafts and scientific pursuits developed and men joined together for the common good in specialised guilds and professions, it was natural that some degree of special legislation was required. It was accepted also that those people, who possess special knowledge or qualifications, may speak with authority on matters concerning or appertaining to the particular sphere of their endeavour.

Professional men enjoy many privileges which are denied to others. Almost by way of return certain services are expected of them. One of these is to assist the judiciary by giving evidence on matters which come within the compass of their particular skill or knowledge. The giving of evidence in a Court of Law, and on a subject in which the witness is assumed to be competent, should be a very simple task and evoke no apprehension. Unfortunately these circumstances do not prevail always. Many competent men, who should be able to speak with confidence and clarity, approach this duty full of anxiety and apprehension and, in consequence, make a poor show in the witness box. They often confuse and confound those who are looking to them for information and bring great stress and worry to themselves.

There is no need for a professional man to feel the slightest anxiety when he is called to do his duty in the Courts. His evidence will be welcomed and received with respect for good, simple and honest information is of the greatest assistance to those who have to judge between men. As is the case with regard to other disciplines, the members of the veterinary profession are confronted daily with problems which can be resolved only by some legal solution. Many of these problems are of a specialised nature and justice can be served only by the aid of authoritative veterinary opinion or factual information. The members of the medical profession meet their friends who are learned in the law in friendly discussion and argument. This is to great mutual benefit.

As our profession advances and the scope of its service to the public expands, the factors which have a legal implication increase in due proportion. The time is ripe for the formation of a Veterinary Legal Society wherein lawyers and veterinary surgeons may meet and review many pertinent problems of mutual regard.

# EXPERIMENTS ON THE COBALT NUTRITION OF SHEEP USING HEAVY COBALT OXIDE PELLETS

by

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**Summary**

1. Experiments are described in which the effect of dosing lambs with heavy cobalt oxide pellets was studied in (a) the Mourne area and (b) the Antrim plateau area in Northern Ireland. In (a) live-weight increase alone was determined and in (b) a phenothiazine treatment was superimposed and live-weight increases and parasitic worm burdens were investigated.

2. In both areas the cobalt-treated groups made better live-weight gains than the controls. This increase amounted in each case to about 4 lb. per head. In (b) phenothiazine treatment had no effect on body weight.

3. In (b) neither cobalt treatment nor phenothiazine treatment had an appreciable effect on stomach or intestinal worm burdens of the lambs.

## Introduction

In an earlier study (Todd and Gracey, 1958) it was found that while there was no apparent increase in live-weight gain in cobalt supplemented lambs over untreated controls, the parasitic worm burdens were lower in the former group. As the worm counts were carried out on a random sample of 5% of the total number of lambs it was realised that the experimental error could be large and that the work would have to be repeated before firm conclusions could be drawn. In addition, to be effective oral dosage of cobalt has to be given at weekly or fortnightly intervals but in these particular experiments a 5% solution of cobalt chloride was used every three weeks, which may not have had the desired effect. In order to overcome this defect of infrequent administration it was decided to use cobalt in the form of a heavy pellet to produce a continuous dosage. Dewey, Lee and Marston (1958) and others have reported upon the provision of cobalt by means of a pellet of 90% cobalt oxide in china clay having a specific gravity of 4.1. This has been found, especially in Australia, to be a suitable way to provide cobalt for ruminants in known deficient areas. After administration the pellet remains in either the reticulum or the ventral sac of the rumen and releases about 0.1 mg. of cobalt per day into solution. As the pellet weighs more than 5 g. it contains sufficient cobalt to satisfy the nutritional requirements of the animal for years, but the effective life may not be longer than one year (Andrews, 1958).

More recently in Eire, O'Moore and Smyth (1958) tested the efficacy of the cobalt pellet in preventing marasmus under conditions of severe cobalt defficiency. A grazing on a calcareous sandy soil was selected because of a history of high incidence of pine.

Cobalt-treated hoggets had significantly greater live-weight gains than untreated controls. The latter showed obvious symptoms of pining during the latter part of the experimental period (Nov. 1957—Aug. 1958) but recovered rapidly following cobalt therapy. All the sheep received anthelmintic treatment at the commencement of the experiment.

In the work to be reported two trials were carried out; in one the effect of cobalt supplementation on liveweight gain was investigated and in the other the effects of cobalt administration plus phenothiazine on liveweight gain, the parasitic worm status of the lambs being also studied. The former trial was carried out on a mountain in the Mourne area where, in previous years, symptoms suggestive of a deficiency of cobalt and/or copper had been reported by the owner. Lambs on a hill farm in the Douglas mountain district of County Antrim were used in the second experiment. The soil in the Mourne area is of granitic origin and has a lower cobalt content than most other soils in Northern Ireland, while in the latter area the soil is basaltic in origin and possesses a relatively high cobalt status (McConaghy).

## Experimental Methods

*A. Mourne area*

On the 13th June, 1958, the Greyface (B.L. x B.F.) ewe lambs from a flock were weighed and divided into 2 groups of equal weight, each group containing 36 lambs. Cobalt pellets were administered to one group. Both groups were then turned on to the mountain where they remained until 31st October, when they were again weighed.

*B. Antrim area*

On 4th June, 60 Greyface lambs of approximately the same size were selected from a flock of 200. These were weighed, divided into 2 groups of approximately equal liveweight and each animal in one group given a cobalt pellet. Four other similar lambs were taken from the flock for slaughter and stomach and intestinal worm counts.

These 2 groups of lambs were again weighed on 2nd July, each group being split into two sub-groups of approximately equal live-weights. The lambs in one of each pair of sub-groups were treated with phenothiazine (dose 15 g.).

On 6th August all the lambs were again weighed and the phenothiazine treatment was repeated.

Final weighing took place in September and three lambs from each of the four sub-groups were taken for slaughter and assessment of total and differential species counts of internal parasites.

*Administration of cobalt pellets*

Several types of balling-guns are available for administering the bullets to sheep. Some of these possess a tube for insertion into the oesophagus. For the small number of animals involved in these experiments, however, it was found satisfactory to give the bullets by hand after they had been dipped in an oil such as pea-nut oil.

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## Results

*Live-weight gains*

In both the Antrim and Mourne experiments there was a difference in weight in favour of the cobalt-treated lambs, this being an average of 4 lb. per head in the former area and 4½ lb. per head in the latter.

(*a*) *Antrim plateau*

The average live-weights in the different groups at different stages of the experiment are set out in Table I.

TABLE I.

*Average weights of lambs (lb.)*

| *Date of weighing* | *Cobalt treated* | | *Control* | |
|---|---|---|---|---|
| 11th June | 40.5 | | 40.2 | |
| 2nd July | 57.4 | | 54.9 | |
| | *Phenothiazine treated* | *No Phenothiazine* | *Phenothiazine treated* | *No Phenothiazine* |
| | 57.5 | 57.2 | 54.3 | 55.5 |
| 6th August | 68.9 | 69.5 | 66.4 | 65.7 |
| 29th August | 75.0 | 75.4 | 70.8 | 70.8 |
| Overall live-weight gain (11 weeks) | 34.5 | 34.9 | 30.6 | 30.6 |
| Difference | + 3.9 | + 4.3 | | |

(*b*) *Mourne area*

Since lambs on the mountain are gathered only at infrequent intervals, it was not possible to take a series of weighings of the lambs. The average weights of the two groups of 36 lambs at the beginning and end of the experiment are set out in Table II.

TABLE II.

*Average weights of lambs (lb.)*

| | *Cobalt treated* | *Controls* |
|---|---|---|
| At beginning of experiment | 43.7 | 43.8 |
| At end of experiment | 67.9 | 63.4 |
| Live-weight gain (20 weeks) | 24.2 | 19.6 |
| Difference | + 4.6 | |

*Effect on parasitological status* (Antrim area)

The worm counts of the four lambs slaughtered at the beginning of the experiment are set out in Table III, while Table IV details the live-weights and carcase weights as well as the total and differential species worm counts of the 12 lambs slaughtered at the completion of the experiment. While the highest average total worm count (7,800) was found in the lambs which received cobalt only, this group had the lowest count if the large total for one lamb E.443 (from which a pellet was not recovered) is excluded. It can be said, however, that there was no significant difference in the worm parasite burdens of the four groups, the number of worms approximating that obtained in the previous year.

TABLE III.

*Pre-experiment parasite levels of lambs*

| Lamb No. | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Stomach: (Ostertagia) | 300 | 1,200 | 300 | 100 |
| Small Intestine: (Nematodirus) | 500 | 1,400 | 1,300 | 600 |
| Tapeworm (M. expansa) | 3 | 4 | — | — |

In four of the six treated lambs slaughtered at the end of the experiment, pellets were found in the ventral sacs of the rumens. These pellets had a shiny surface as opposed to the dull appearance of the fresh specimen. The weights of the former after drying, were slightly greater than the average weight of an unused pellet (5.33 g. and 5.29 g. respectively). This increase in weight is not considered significant since in only one instance were there signs of concretions of calcium phosphate which took the form of a few small white spots on the pellet's surface. It is possible, however, that with excessive deposits the release of cobalt could be substantially reduced.

## Discussion

### *Live-weight gain*

In both experiments the cobalt-treated lambs made greater live-weight increases than the control groups, the respective figures being 24.2 lb. and 19.5 lb. for the Mourne experiment and 34.7 lb. and 30.6 lb. for the Antrim experiment. In previous work (Todd and Gracey, 1958) carried out on the same mountain in Antrim no effect on growth rate was found from dosing with cobalt but, as pointed out above, this may have been due to the long interval (3 weeks) between successive treatments. The live-weight gains in the present trials were consistent and the successive weighings in the Antrim experiment (Table I) showed that the treated animals were 2.5 lb. heavier than the controls three weeks after administration of the pellets and that the difference increased at later weighings.

The magnitude of the increase in live-weight gain of the treated lambs is, however, small in comparison with increases reported from areas of known cobalt deficiency. For example, Stewart *et al.* (1955) in experiments carried out in 1952-53 in Kirkcudbrightshire found increases ranging from 12-21 lb. in treated over control groups in a period of about 16 weeks. The results of this trial, therefore, agree with our earlier findings that there is no marked deficiency of cobalt in either area. Nevertheless, these results suggest that marginal deficiencies of cobalt do occur, and this is strengthened by the fact that physically the treated lambs were much better specimens with superior fleeces than the lambs which received no cobalt pellets.

Table IV shows that of the six treated animals selected for slaughter only four had retained their pellets. No indication can be obtained from the figures as to when the other two shed their pellets, since one (E.443) was the heaviest of the three selected for slaughter from the cobalt group, and the other (E.348) was the lightest selected from the cobalt plus phenothiazine group.

From Table I it is evident that phenothiazine treatment had no effect on live-weight gains in either the cobalt-treated group or the control group.

**TABLE IV.**

*Weights and worm parasite burdens of lambs slaughtered at end of experiment*

| Group | No. | Live Weight (lb.) | Carcase | | Worm Counts | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Wt. (lb.) | Per Cent.† | Total | Stomach | | S. Intestine | |
| | | | | | | Ostertagia | Haemonchus | Trichostrongylus | Nematodirus |
| Control | E.273 | 65 | 29 | 44.6 | 3,400 | 1,700 | — | 1,000 | 700 |
| | E.294 | 72 | 35 | 48.6 | 4,400 | 2,900 | — | 600 | 900 |
| | E.390 | 66 | 29 | 43.9 | 8,400 | 4,400 | — | 2,800 | 200 |
| Average | | | | | 5,400 | 3,000 | — | 1,800 | 600 |
| Phenothiazine only | E.313 | 69 | 30 | 43.5 | 5,300 | 2,400 | — | 2,900 | — |
| | E.349 | 68 | 28 | 41.2 | 2,500 | 1,900 | — | 600 | — |
| | E.388 | 75 | 36 | 48.0 | 4,900 | 1,400 | — | 3,000 | 500 |
| Average | | | | | 4,200 | 1,900 | — | 2,150 | 150 |
| Cobalt only | E.184 | 71 | 32 | 45.0 | 2,100 | 100 | 10 | 1,600 | 400 |
| | E.316 | 67 | 31 | 46.3 | 2,000 | 900 | — | 500 | 600 |
| | *E.443 | 76 | 32 | 42.0 | 19,400 | 12,500 | — | 6,000 | 900 |
| Average | | | | | 7,800 | 4,500 | — | 2,700 | 600 |
| Cobalt plus Phenothiazine | E.101 | 68 | 31 | 45.6 | 7,200 | 1,700 | 100 | 4,600 | 900 |
| | E.347 | 69 | 31 | 45.0 | 7,100 | 5,500 | — | 600 | 1,000 |
| | *E.348 | 62 | 23 | 37.0 | 8,100 | 4,300 | — | 3,500 | 300 |
| Average | | | | | 7,500 | 3,800 | — | 2,900 | 700 |

† Carcase weight as percntage of live weight

* Pellets not recovered at slaughter.

*Effect on parasitic worm burdens*

When compared with the results of the previous work (Todd and Gracey, 1958) in which significantly lower worm burdens were found in the lambs which received cobalt, the results of the present experiments would appear to be contradictory, but may in fact be largely due to sampling error. The highest total worm count occurred in the " cobalt only " group and the second highest in the "Cobalt plus phenothiazine" group. Both of these groups, however, had lambs which had in some way lost their pellets and had high total worm counts, especially the lamb in the " cobalt only " group. The exclusion of these two lambs from the assessment would leave the " cobalt only " group with the lowest total worm count, but the " cobalt plus phenothiazine " group would then possess the highest count.

The highest worm counts approximate those of control lambs in 1957. In view of the very wet season in 1958, one would have expected even higher worm counts in this flock. While the *Nematodirus* figures are lower for 1958 the *Trichostrongylus* count is much higher.

When considered in conjunction with the previous experiment the parasitic worm burdens *per se* would appear to exert little or no influence on growth rate.

At present day prices for fat lambs the use of cobalt pellets on these lambs was economically sound, since an outlay of 1s. 6d. per pellet resulted in an increase of about 2 lb. carcase weight worth about 5/-, to which must be added the heavier fleece.

**Acknowledgments**

We desire to thank the two farmers (Mr. R. A. C. Allen, Kiaora Slatt, Ballymena, County Antrim, and Mr. A. P. Wilson, The Course, Richhill, County Armagh) who placed their flocks at our disposal.

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# HAEMORRHAGICA SEPTICAEMIA OF CATTLE
## Observations on Some Recent Work

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Some advances have been made in the control of haemorrhagica septicaemia of cattle by vaccination and in understanding the nature of the causative organism *Pasteurella multocida* type I (Robert's classification or type B Carter's classification). There are still important gaps in our knowledge and the present situation is reviewed briefly in this paper.

### Aetiology

This disease as it exists in Asia, Africa and southern Europe is quite different from the "shipping fever complex" of the U.S.A. It is a fulminating bacteraemia caused by *P. multocida* type I, and this is a constant feature of it across Asia from the Middle East region to the Philippines and apparently is the same in Southern Europe and Africa. Occasionally cattle die from infection with other serotypes such as type IV, but these cases are not common and occur sporadically in all countries. What is known of the pathogenesis of the disease has been reviewed by Bain (1957) and a general review of the disease in Asia was given by Vittoz (1952).

No other pathogen such as a vitrus has been incriminated, and most outbreaks occur in conditions of heightened host susceptibility currently called "stress". As far as we know it does not matter whether the stress is physiological, nutritional or caused by a minor infection; the end result is the same, a fatal type I pasteurellosis.

The Journal of the American Veterinary Medical Association in an editorial (1958) compares the disease with "shipping fever", swine plague and cornstalk disease. These are not fair comparisons for in these diseases pasteurellas are found only occasionally whereas in *haemorrhagica septicaemia* they are always recovered and are invariably of one serotype. The suggestion in the editorial that the disease should be called "Asian Pasteurellosis" is not likely to be accepted; it is neither exclusively Asian nor are all cases of pasteurellosis haemorrhagica septicaemia. The only "haemorrhagica septicaemia" pasteurella obtainable by the author from the U.S.A. have apparently all stemmed from an outbreak of severe pasteurellosis in bison in Yellowstone Park in 1922. Carter in his surveys has not found the serotype in North America. Earlier reports such as those of Little and Lyons (1943) and Rosenbusch and Merchant (1939) may be misleading in that their differentiation did not go far enough and that strains equated with those from the bison disease may have proved different if examined more closely. An example of the imperfections of current classifications came to light in Australia recently. The isolation of an unusual type I strain was reported by Bain (1957); another has since been isolated. It came from an ox though there was no evidence of haemorrhagica septicaemia, a disease unknown in Australia. The strain reacted in active and passive mouse protection tests as a type I. However it differed from the Asian strains in being pathogenic for chickens and failing to ferment xylose. A culture was sent to Dr. Carter in Canada and was identified as

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a type I (type B). Subsequent antigenic fractionation in our laboratory shows that whilst the polysaccharide and protein antigens are similar to those of Asian type I, the purified lipopolysaccharide prepared by the method of Westphal, Luderitz and Bister (1952) is different chemically, biologically and serologically (Bain and Know in press). MacLennan and Rondle (1957) have shown that the lipopolysaccharide of type V is type-specific. This might prove to be the most fundamental way of classifying pasteurellas though the technique for preparing purified lipopolysaccharides is rather beyond the resources of the average diagnostic laboratory. Possible difficulties are foreshadowed by our failure to get useful yields of lipopolysaccharide from the two type IV strains tried.

In the naturally occurring disease in Asia there is no need to postulate any increase in virulence of the pasteurella by passage. The carrier rate is not high and the first animal in a village which develops clinical infection spreads abundant organisms in the feeding and watering place, thus giving other animals the opportunity to become infected.

## Antigenic Structure

In 1954 the writer postulated that a particular antigenic constitution, tentatively called "phase I" was responsible for the demonstrable superiority of very recently isolated strains as vaccines in cattle. The small 2 mgm. dry weight doses in oil adjuvant base found sufficient to protect cattle against challenge for upwards of a year was thought to contain above-threshold amounts of the immunizing antigens whereas subcultivated lines were less effective unless the doses were increased. It was not expected that this would be due to one antigen alone. Ouchterlony plates showed up to twelve lines in extracts from cultured pasteurellas. The details of fractionation are being published elsewhere in collaboration with Dr. K. Knox. Polysaccharide, lipopolysaccharide and protein fractions have been prepared. The polysaccharides behave as haptens and absorb some but not all of the mouse protective power from whole antisera. The protein fractions, which usually contain some of the other fractions, except in certain variant strains, are protective actively even in the absence of contaminating polysaccharide. The lipopolysaccharide is toxic, may be absorbed on to mammalian erythrocytes, is partially protective to mice in active immunity tests and capable of absorbing some but not all of the mouse protective power from antisera; these properties are not abolished by heating or treating with trypsin. In all, they suggest that several antigens participate in immunization.

Attempts to pinpoint a special "phase I" antigen have proved surprisingly difficult. Peculiarities of the pasteurellas limit the usefulness of agglutination and complement fixation tests. Mouse protection tests obviously do not depend on a single protective antigen. The most promising means to date of demonstrating a special antigen in recently isolated cultures is the fluorescent antibody technique of Coons applied to smears of the bacteria using coupled sera absorbed with combinations of antigens. In the "Insein" strain of *P. multocida* type I there has been demonstrated by this means an antigen which is present in pasteurellas grown *in vivo* in the ox and which persists in detectable amounts for a few subcultivations thereafter on solid media. This antigen is not capsular polysaccharide as the antibody is not removed by this substance. The capsular polysaccharide is produced readily on artificial media to the

extent of 0.5% of the dry weight of the bacteria. It contains a ketose sugar detectable in amounts as low as a microgram. From pasteurellas harvested from infected cattle no polysaccharides can be recovered by fractionation nor can ketose be detected in any of the extracts. The cells have large capsules. There is no justification or proof for the common statement recurring in the literature that the pasteurella capsule is polysaccharide. The gentlest extraction of cells such as by 2.5% NaCl yields a multiplicity of antigens which can be demonstrated chemically, in gel precipitin tests or biologically by toxicity, pyrogenicity and haemagglutination. As far as we can see none of the antigens are exclusively somatic or exclusively capsular, although the proportions vary in different levels.

It is desirable that the antigens should be separated and characterized so that those effective in immunizing are recognized. When this is done, intelligent improvement in vaccines can be achieved by selecting strains having the best natural content of desirable antigens and by arranging media which will enable them to develop to the greatest degree. The agglutinability of type I, reflecting the antigenic arrangement, is extremely sensitive to small changes in the medium. This serotype ferments sucrose, glucose and laevulose amongst other sugars. When grown on tryptose agar containing either 1% sucrose or 1% glucose the bacteria are inagglutinable in homologous antisera. If the sugar is laevulose the suspension may be partially autoagglutinable. A medium described by Bain (1954) produces a bacterial suspension which has a level of agglutinability extremely helpful in an agglutination test for detecting naturally acquired immunity in cattle. The addition to this medium of 0.25% tryptone or M/10,000 D L tyrosine and D L tryptophane produces a suspension which is inagglutinable. The agar agglutination test (Bain 1955) is also dependent on the medium employed, any deviation leading to erratic results. All these experiences point to the differences in phenotype which can arise from a population uniform in genotype, as the manipulations mentioned above are carried out with cultures only one or two steps removed from the infected ox blood. Current practices in the production of vaccine aim at convenience and maximum yields of cells rather than in antigenic quality of the cells. Experiments on the duration of immunity with a standardized weight of cells grown in various ways would evaluate the importance of media and general techniques in the production of vaccines.

### Growth and Nutrition

Until we know what antigens we wish to conserve, efforts at improvement in growth can only be general rather than specific. The last published systematic work on nutrition of *P. multocida* was by Jordan (1952) and this was not concerned with the special demands likely to be imposed by methods of mass cultivation.

In our laboratory the use of pure oxygen for aeration was found to be inhibitory to growth. Catalase activity disappeared. The effect could be partially overcome with large amounts of blood. This accords with Jordan's findings. No advantage was found with air-$CO_2$ mixtures. With ordinary media it is preferable to use simple air for aeration.

In our experiments with casein hydrolysate medium, chosen for its ease of production in quality, the best yields were obtained with some additions of tryptic digest to the acid hydrolysate (Bain and Jones 1958). Growth reached the highest

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point in shaker flasks (4.5 gms. per litre) when autodigest of pancreas was added as recommended by Sterne (1958). However some difficulties have been experienced in Asia in obtaining sufficient pancreas glands. Mr. R. F. Jones of this laboratory has found that the autodigest cannot be replaced by commercial pancreatin nor by spermine phosphate, which seemed a likely streptogenin-like stimulatory factor because of its abundance in pancreas and its known stimulatory effect on lactobacilli. A pancreatic digest of liver added to casein-yeast extract medium as a filtrate to the level of 4% gave yields in shaker flasks of 3.5 gms. dry weight of bacteria per litre but it has not yet been tried in vortex tanks. Individual growth factors identified by Jordan as giving rise to the maximum number of colonies on solid media had no enhancing effect when added to the complex medium used in our routine production. These included oleic acid, nicotinamide, thiamin, pantothenate and l-cystine. The most potent stimulatory factor for pasteurellas remains unidentified at present but possibly it is a ratio of quantities rather than a single substance.

## Vaccines

Oil adjuvant vaccine was developed in Burma in 1952 (Bain 1953). It was discussed extensively at an FAO Training Centre in India in February 1953 and adopted for experimental purposes in several countries. Subsequent reports have appeared by Bain (1954), (1956), Iyer, Gopalakrishnan and Ramani (1955), Dhanda, Das, Lall and Seth (1956), and Dhanda and Lall (1958). These reports all deal with the same vaccine made to the same formula with the same serotype with minor variations in media. All workers are agreed that a dose of 2-3 ml. confers immunity for 8-12 months against substantial challenge by subcutaneous injection. Alum-precipitated vaccines have also been used by Iyer *et al.* and a number of others (unpublished). In all known cases these vaccines are inferior to the oil-adjuvant one but superior to plain bacterin. The soluble vaccine of Delpy is used in some countries. An incidental observation in this laboratory is that the sera from rabbits inoculated with crude soluble extracts of pasteurellas give more lines on Ouchterlony plates than sera from those inoculated with intact bacteria.

## Field Trials

If the incidence of haemorrhagica septicaemia could be reduced substantially by measures directed solely against the pasteurella there would be less need to worry about any hypothetical primary pathogen such as a virus. These are difficulties in carrying out field tests in Asia because the incidence of the disease in a given place or season is unpredictable and it is not always possible to identify animals properly. The mobility of investigators is limited in the rainy season and reports of deaths among the cattle are usually handled by minor local officials such as village headmen. The only solution is to conduct large block experiments in the most susceptible areas, keeping say 50,000 head vaccinated for 3 years and comparing the deaths with those in existing records.

During 1955 and 1956, approximately 85,000 head of cattle and buffaloes were vaccinated with 3 ml. of oil adjuvant "phase I" vaccine. In the subsequent period only 8 animals were alleged to have died from haemorrhagica septicaemia. These

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results do not merit more precise treatment. Of 4,000 animals vaccinated on government farms in India, Ceylon and Thailand, none were reported as dying of the disease in the next succeeding two years. These results are more reliable and more interesting, as, overall, between 50-100 of these animals might have been expected to die during the period. It was rarely possible to have a group of unvaccinated control animals in the same farm or village.

The best single example of the efficacy of a vaccine in the field comes from Ceylon. On a plantation 125 buffaloes were vaccinated with alum precipitated vaccine, and a few days later the remaining 125 with an oil-adjuvant one. A month after the last inoculations were made, haemorrhagica septicaemia appeared and twenty-five deaths occurred—all in the alum group, none in the oil group. The animals were running together.

Dhanda and Lall (1958) report a field trial with oil adjuvant vaccine in which one animal only of 7306 vaccinated died in the ensuing rainy season (5 months). An unspecified number of deaths occurred amongst unvaccinated animals in the area and amongst those inoculated with conventional broth bacterin.

These preliminary results are encouraging and are the basis for further trials being conducted in S.E. Asia at present.

**Summary**

1. Progress is reveiwed on research into haemorrhagica septicaemia of cattle.
2. Accumulating reports show that improved vaccines used prophylactically can prevent the disease in the field.

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# A CLINICAL STUDY OF BOVINE TUBERCULOSIS IN BANFFSHIRE

## THE PATHOLOGICAL LESIONS, PART 2.

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### Intestines and Stomach

Tuberculosis of the alimentary tract in cattle, as in man, is a frequent manifestation of the extension of infection but primary lesions are seldom seen. In a few instances, calves, which had suckled cows with tuberculous mastitis, were examined post mortem. Primary infection of the bowel was not found macroscopically but extensive infection of the mesenteric glands was always present. This contrasts with the findings of the Royal Commission (Second Interim Report, 1907) that calves, suckling cows with infected udders, had tuberculosis usually localised to the intestinal tract and affecting the intestinal wall in all cases.

In a consecutive series of 100 autopsies on cattle affected with tuberculosis, 21 had tuberculous enteritis of which 12 showed evidence of an acute generalised blood stream infection, and 2 of chronic haematogenous infection. Three showed no lesion in the mesenteric glands but all showed pulmonary lesions. The glands of the alimentary tract had caseous or calcareous lesions in 72 out of the 100 cases. The general incidence of disease of the alimentary tract was 62, or 12.6 per cent., out of 491 clinical cases.

Lesions of tuberculous enteritis occur along the intestinal tract. In this series, the small intestine was affected most often and caecal lesions were common also.

The lesions take the form of yellow tubercles, or, more commonly, irregular ulcers extending deeply into the bowel wall. These ulcers vary in shape and size. They may take the form of elongated erosions or simple craters with raised edges. They may be few in number or very numerous, involving almost all the bowel wall. One case of congenital disease showed small caseous tubercles in the bowel wall as well as ulcers. One 8 year old cow showed small caseous lesions in the bowel wall with ulceration of the bowel mucosa, and another gross lesion in the mesenteric glands with healed ulcerations distributed extensively throughout the length of the small intestine.

Calmette (1923) considers tubercle infection of the stomach, in cattle or man, to be a pathological curiosity and Baldwin *et al.* (1927) state that it is extremely rare. One case was found in the present series in an 8 year old dry cow. The lining of the true stomach (abomasum) showed three small irregular ulcers, about 1 cm. in diameter and less deep than others in the intestine. All three ulcers were situated near the junction of the abomasum and duodenum. The cow had acute miliary tuberculosis. A more detailed description of the lesions has been given elsewhere (McKay 1941).

The faeces from tuberculous animals must be regarded with considerable suspicion since such a high proportion of affected animals show disease of the intestinal tract. Taken together with those animals, suffering from tuberculosis of the lungs, which

may be swallowing quantities of sputum and whose faeces may be heavily infected, it can be assumed, for practical purposes, that faeces constitute a considerable risk in housed animals. There will be the risk of contamination of milk and clothing, and under poor hygienic conditions the drying of faeces on the stalls will increase the risk of infection by inhalation. The risk in grazing animals seems to be slight according to the findings of Maddock (1936). This worker grazed calves on faeces-infected pasture, under controlled conditions, and subsequently failed to find any evidence of tuberculosis on post mortem examination. This same worker (1933) showed that under average conditions the bacillus of bovine tuberculosis will survive on pasture for six months.

### Liver

Tuberculous disease of the liver is one of the commonest manifestations of tuberculosis in the abdominal cavity of cattle at all ages, and it was observed in 382 or 35 per cent. of the cases examined in this series.

Lesions occurred on the liver capsule in every case of diffuse peritonitis and in almost every case of miliary tuberculosis. Occasionally tuberculosis either of the liver or of the hepatic gland was found without abdominal lesions other than in the mesenteric lymph gland.

The hepatic lesions usually consist of sparse pin-head to pea sized caseous nodules on the surface of the liver. Sometimes they are very numerous. In other cases large caseo-purulent lesions involving a large part of the liver were found. Usually in congenital disease, multiple discrete pin-head lesions scattered through the liver substance were seen. In fact, the site of the lesions in liver and spleen affords a diagnostic criterion of congenital disease.

Frequently the bile contains the bacillus, apparently even when no macroscopic lesion is found in the liver and the bile may carry the organism to the intestines.

Tuberculous hepatitis in man appears to be similar to the bovine type in its incidence and character.

### Spleen

The spleen is a very common site of tuberculous lesions in cattle, occurring in 543 or 50 per cent. of cases. The lesions are apparently confined to the capsule in the adult animal, and usually lesions in the substance are accepted as indicating congenital infection. Probably this difference between the young animal and the adult is explained by the fact that, in the adult, lung lesions are so extensive before the disease becomes generalised that the animal dies before lesions in the spleen can develop. In the young congenitally infected animal, the generalisation is established while the lungs are still inactive. The adult type of lesion takes the form of flat, sessile caseous or haemorrhagic fibrous lesions on the capsule, or a general inflammatory condition of part or all of the capsule. The congenital lesions are small caseous nodules, the size of rice grains or peas, in the stroma of the organ. Usually these are few in number but occasionally they are numerous. Larger lesions, of the size of walnuts, have been met with, very occasionally.

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## Peritoneum and Pleura

*Peritoneum.* Tuberculous peritonitis occurs either as a diffuse widespread condition or it exists as a localised lesion, frequently as the result of contact spread from a diseased liver. It existed in some 610 or 56 per cent. of the cases dealt with and in most instances it accompanied miliary tuberculosis of the lungs, and, when widespread peritoneal lesions existed, the liver was always affected. Grey fibrinous peritonitis is the usual form, although in more chronic forms some caseation takes place and the lesions then develop into a form of flattened polypus with a distinct pedicle.

In man tuberculous peritonitis is considered to arise usually from ulceration of a mesenteric gland or from the bowel wall. In cattle however, except in cases where the liver is diseased, it appears to arise from a bacillaemia accompanying a generalised miliary infection. Miliary infection without peritonitis is found rarely. Usually there is not much exudate but there may be extensive adhesions.

*Pleura.* This is one of the commonest sites of tuberculosis met with on post mortem examination of cattle and it was observed in 751 or 69 per cent. of the cases other than those of simple glandular disease. Usually, in the early stages in cattle, there is merely a diffuse inflammation, and this proceeds later to the typical "grape" or classical "perlsucht" type of lesion. These lesions can be extremely widespread in the thoracic cavity and cause grave adhesions of the lungs to the chest wall. They show some chronicity and frequently show evidence of calcification to a marked degree. The pleura near the first few ribs and in the region of the diaphragm are the commonest sites. The pleura may be up to one inch or more in thickness with multiple easily recognisable areas of calcification.

As in peritonitis it is not common to find much exudate in cases of tuberculous pleurisy.

## Heart and Pericardium

Tuberculosis of the heart is relatively uncommon in cattle, occurring in 8 or 0.7 per cent. of the cases. Usually it is concurrent with severe generalised disease, but it has been encountered as the only lesion found on autopsy, apart from a lesion in a prescapular gland. Generally one or both of the prescapular lymph glands show lesions when the heart is affected. Sisson (1917) does not mention that the prescapular glands receive afferent vessels from the heart, but it has been my experience that in most instances these glands show lesions when the heart or pericardium is diseased. One case, for instance, to which reference has already been made, had a caseocalcareous lesion in the right auricle and no other lesion anywhere except in the right prescapular gland.

In the majority of cases of cardiac tuberculosis the lesions are extensive and show advanced calcification. One case, a 3 year old heifer, was so badly affected that the heart consisted almost entirely of tuberculous tissue, much calcified, and hypertrophied to such an extent that it weighed 42 lb. as against the usual 5 lb. for an animal of its size. It is common to find the ventricular walls so calcified as to make function almost incredible. In one heart, lesions have been found in both auricles, both ventricles, and in the heart valves, yet the animal showed no great distress.

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The pericardium is affected frequently as an extension of tuberculous pleurisy, the commonest manifestation being chronic organised tuberculous pericarditis. The pericardium may be up to an inch in thickness and calcareous. Frequently the disease extends into the heart tissue. Acute pericarditis is not seen often.

### Kidneys

Tuberculous nephritis occurred in 54 or approximately 5 per cent. of the cases studied. Tuberculosis of the urogenital tract has not been encountered as a primary manifestation of the disease and in this it is apparently similar to the condition in man. When it is met with in cattle, usually it is part of a generalised miliary infection although a small percentage is due to a less widespread infection. A few cases of miliary disease of the lungs did not show macroscopic kidney disease. In every case, pulmonary disease was present, and it was obvious that the disease had been spread by the blood stream.

In the majority of cases the lesions are small discrete greyish-white tubercles in the cortex of the kidney. They are seen with ease when the capsule is removed. On rare occasions, whole lobules or indeed, almost all the kidney substance, has been involved.

It is rare to find unilateral lesions although frequently one kidney is affected more markedly than the other. Sometimes a lesion softens and breaks down to form a cavity similar to those found in the lungs.

It is common in tuberculous nephritis to find that the adrenals are also involved and in about 50 per cent. of cases involving the kidneys of cows the uterus is affected also.

The condition has been found at all ages and every case of congenital disease showed renal involvement.

In man unilateral disease of the kidney is fairly common in the early stages of the "surgical" type but later the second kidney often becomes involved. This is apparently the result of lymphatic spread from the diseased kidney via the two renal lymphatic plexuses or, more commonly the bacilli are carried to the bladder and then ascend by the lymphatics of the ureteric wall. Extension from the bladder up the lumen of the ureter to the sound kidney is not considered likely.

### Bone and Joint

Tuberculosis of bone and joint, met with so frequently in man, is relatively uncommon in cattle. The pathogenesis of tuberculosis of bone has been the object of most careful research by many workers.

All tuberculous bone disease commences as an osteomyelitis originating from a minute tubercle which is formed in the marrow and is usually of lymphatic origin and perivascular.

The initial lesion is a medullary proliferative inflammation bringing about collections of greyish granulations with connective tissue fibres buried in a mass of leucocytes. These gradually coalesce into caseous tubercles, or, if the lesion proves abortive, they atrophy. When the former takes place the bony trabeculae are rapidly

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involved. Two types of disease process can then develop. Either layers of osteoblasts collect round the tubercles in successive layers, constituting a condensing osteitis, or the bony trabeculae undergo lacunar erosion, the calcareous matter disintegrates into fibrous tissue and a rarefying osteitis is established. Both types generally exist together in the same lesion. In the midst of this mass small sequestrae of the bony tuberculae may be found.

Tuberculosis of the bone in oxen nearly always occurs in animals of 2 to 3 years of age or older. In the present series 18 (1.7 per cent.) cases of tuberculosis disease of bone or joint were encountered. Of the lesions 11 (61.1 per cent.) were in vertebrae, 3 (16.7 per cent.) in joints and 4 (22.2 per cent.) in the sternum. In only 5 of the cases were the animals adult; the remainder were in the 2 to 3 years old age group. Usually the spongy bones are attacked, e.g. the body of a cervical or thoracic vertebra. Joint disease is less common.

Young (quote by Calmette, 1923) in an investigation of the distribution of bone lesions in human subjects gives the following figures: vertebrae 41.6 per cent., hip joint 42.1 per cent. (seldom met with in bovine disease), knee 10.3 per cent. (met with in 2 or 11.1 per cent. of this series), astragalus 3.3 per cent. (not seen in the present investigation).

The commonest lesion in the body of a bovine vertebra shows necrosis of the bone and caseation of the bone marrow with usually some impingement on the spinal canal. This results in some locomotor disturbance, of a nature depending upon the site of the lesion, and frequently ending in ability to rise and stand.

Tuberculous disease of the sternum usually affects a large area of the bone marrow. There may be considerable softening and caseation of a hard " core " in the middle of a liquified lesion. Usually clinical indications are not manifested and in most instances the disease is detected first on examination post-mortem.

### Accessory Glands

Tuberculous disease of the pituitary gland has not been detected in this investigation and it has been found only once in the thymus gland.

The adrenal gland, so commonly affected in human tuberculosis, is seldom found to be affected in cattle and when it is diseased, the tuberculous process is generalised. Tuberculosis of the adrenals has been found in 12 per cent. of advanced cases and in adult animals only.

Tuberculosis of the prostate glands has been observed in one case only, a 2 month old male calf suffering from congenital tuberculosis.

The testicles were found to be involved in two cases of extensive disease in adult bulls, and small fibro-caseous lesions were found in one 2-month old animal affected with congenital tuberculosis.

### Tongue

This condition has been met with only once in the course of this investigation and it appears to be very rare in cattle.

In the case mentioned the lesion consisted of one caseous nodule at the side of the dorsum of the tongue and it was surrounded by a thick layer of tissue.

The retropharyngeal glands were extensively affected and greatly enlarged.

### Central Nervous System

Tuberculosis of the central nervous system is uncommon in cattle and when it does occur it has been found in young animals and almost always in congenitally infected cases. This however does not hold true for tuberculous disease of the meninges since this has been noted, fairly frequently, in young animals without congenital lesions.

Brain lesions were detected in 7 or 0.65 per cent. of the cases dealt with, all of which had shown some clinical indication of brain disease; others may have existed without showing clinical signs and consequently passed undetected.

Usually the lesions have been multiple, nodular in shape and caseous with numerous small calcifying centres. As a rule they are embedded in the substance of the cerebrum and have been found as large as a pigeon's egg, although more often they are about the size of a large pea.

They have been found in each frontal pole of the cerebral hemispheres, in the wall of the lateral ventricle, above the choroid plexus of the lateral ventricle, in the corpora medullare and on the surface of the medulla oblongata. In addition tuberculomata of some size have been found with pedunculated stalks attached to the meninges.

Meningeal tuberculosis accompanies brain tuberculoma always, and has existed alone in the cord in cases where the brain was not affected.

In the cord the meningeal lesions, the size of rice grains, may be very numerous, and they have been found throughout the entire length of the spinal canal. The lesions are grey, necrotic or caseous. The disease in the brain or meninges has been almost always of haematogenic origin as an extension of a general miliary infection, although three cases were encountered with little disease elsewhere, of which one, for example showed inconsiderable pulmonary and hepatic lesions only.

### Eye

Tuberculosis of the eye is uncommon in cattle, occurring in only 9 or 0.8 per cent. of the cases examined. In all cases it was associated with a miliary or congenital infection generally the latter.

In man tuberculosis of the eye is met with more frequently. Infection of the conjunctiva has been described frequently, the lachrymal sac is affected sometimes and many cases of *keratitis profunda* have been reported. The iris has been the site of tuberculous disease in cases reported by a number of workers, and the choroid has been found to be involved in the terminal stages of general miliary tuberculosis. It is also seen in cases of early tuberculous meningitis, especially in children. The retina has been found to be the site of tuberculosis on many occasions but the optic nerve is not affected often. The sclera is affected sometimes.

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In contrast to conditions in man, tuberculous conjunctivitis alone was not recognized in this series of bovine cases. All of the cases showed disease of the cornea. Indeed the clinical condition of the cornea was the pointer to the presence of ocular disease. The iris was affected in 2 of the 9 cases. In both, the eyes were grossly diseased, affected to a degree which would never have been met with in human cases for human eyes would be submitted to sugical intervention long before the disease had become so extensive. It was not possible under the conditions of the study to say whether the choroid was affected. None of the Banffshire cases showed sclerotic involvement but all 9 showed disease of the retina.

Tuberculosis of the eye appears to occur at all ages and equally in both sexes. Primary tuberculosis of the eye is exogenous in origin and is found in the exposed parts, eyelids, conjunctiva, cornea and lachrymal sac. The secondary type of disease is more common and miliary lesions are characterised by small yellow or grey elevations on the surface of the iris with general thickening of the surrounding iris stroma. The blood vessels are usually only slightly distended in the early stages.

## Congenital Infection

At one time the occurrence of congenital infection was doubted and there is still no final agreement as to how infection is transmitted from the dam to the foetus.

McFadyean (1899) considered the foetus to be infected from a diseased placenta but Calmette (1923) thought that transmission could occur through the placenta in man and cattle. Aguecia (1933) showed that *M. tuberculosis* may pass through the placenta without the presence of lesions either in uterus or foetal membranes and Bohmer (1934) reported that, of 300 foetuses from tuberculous dams, 9 were tuberculous but in only 1 was there tuberculosis of the uterus.

In the present investigation, which covers a period of two years, 12 cases of congenital infection were encountered amongst clinical cases of tuberculosis, and 4 others were discovered in slaughterhouses amongst animals which showed no evidence of disease during life and survived in good health until the age for slaughter at between 2 and 3 years. Two instances of tuberculosis in foetuses were noted.

Twelve clinical congenital cases represent approximately 4 per cent. of the annual clinical incidence of tuberculosis in Banffshire. Approximately 8,000 cattle are slaughtered annually in the abattoirs of Banffshire, and 4 congenital cases over a period of two years represent an annual incidence of 0.025 per cent. Assuming that 16 cases (12 clinical and 4 slaughterhouse) represent the true incidence for two years or 8 per year, then with a population of 32,000 cattle of the critical age group, i.e., up to 3 years in Banffshire, it appears that the incidence is approximately 0.02 per cent.

The cases occurred in animals from 2 months up to the age of 3 years and also in two 6-month foetuses. The age distribution was: 2 months, 1; 3 months, 1; 5 months, 1; 6 months, 1; 10 months, 1; 1 year, 2; 18 months, 3; 2 years, 3; 2½ years, 2; 3 years, 1. Since human congenital cases die soon after birth, there appears to be a considerable difference in this respect between men and cattle as 3 years in cattle would represent 18 to 20 years in man.

Contrary to the experiences of Bohmer and Aguecia quoted above, in every case (8) where the post mortem findings of the dam were known, infection of the utĕrus was evident. In all of these 8 cases acute generalised peritonitis with or without vegetative lesions was present and it is suggested that the route of infection was from the peritoneal cavity via the uterine tubules and so to the foetus. In every case the progression of uterine infection, judged from the lessening in the severity of the lesions, was descending, that it, from the tubules towards the cervix.

In some cases the lesions were of a fleshy translucent character confined to the surface of the uterine mucous membrane, but in others the lesions were of a caseous or caseo-calcareous nature involving in some the entire thickness of the uterine wall.

Tuberculosis of the uterus has not been encountered in the absence of tuberculous disease of the peritoneum. Further, tuberculous metritis was co-existent with peritonitis in at least 75 per cent. of cases where the latter structure was severely affected. Peritonitis can exist without metritis but the converse is probably very uncommon. Since 75 per cent. of cows with tuberculous peritonitis also showed tuberculous metritis, and since the progress of the disease appears to be descending, it seems reasonable to argue that the relatively low incidence of congenital tuberculosis is due to failure of conception following occlusion of the ovarian tubules.

The calves that had lived a separate existence all showed the characteristic lesions in the spleen substance but a 6 month old foetus showed macroscopically no evident disease in the spleen. A more detailed description has already been published (McKay 1943).

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# VETERINARY SURGEONS IN THE WITNESS BOX*

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Veterinary and medical students spend a lot of their time and shed a lot of sweat and tears acquiring a knowledge of a great variety of things which they will never be called upon to practise. If the victim has a fair memory, albeit of a temporary nature, he may satisfy the demands of the inquisitors. He will draw a winning number from the drum and in due course be licensed to follow his chosen career.

Then the moment has arrived when he has to leave behind the shelter of his college and the joys of student life and plough his own furrow before a critical audience. He may reflect that there are many things, with which he is expected to be familiar and competent, that have no place in the academic training which he has pursued. He may wonder if the modicum of good luck and the fair memory which have stood him in good stead in the past will bear him with equal safety in a future in which commonsense and good judgment are the prime factors. I remember these moments in my own life very well. I had a reasonably successful student career and I was replete with a knowledge of most of the 'ologies' which were deemed to be so important, but I lived for some time in dread of two demands for my service. The first was that I would be asked to examine a horse for soundness. At home I had been surrounded by horses, thoroughbreds, shires, nags, hunters and carriage horses and I thought that I had such a reasonable idea of the form of a horse that I could assess its suitability for almost any variety of circumstances. At college all this confidence fled. The business of examination was wrapped up in a cloak of mystery, for deceitful men sold horses and only simpletons bought them. It is not surprising that I, and I believe many of my contemporaries also, lived in dread of being asked to give advice to a prospective purchaser. To make matters worse the first horse I examined for soundness and was a handsome 6 year old Strawberry Roan vanner. He went gay and handsome; his limbs were clean. I coughed him, grunted him and galloped him and I could find no fault. He worked for about two hours and then went lame in the near hind. He seemed to be lame in the hip. He never worked more than two hours at a stretch. At last he was disposed of and I was glad, for he was in a big stable which I visited on most days. No one ever discovered what was the cause of his lameness. I gained some comfort from the fact that three very experienced veterinary surgeons told me that they had examined him for purchase and passed him as sound and his subsequent history whilst in their hands was the same as was mine. The other thing which gave me cause for apprehension was that I might be called to give evidence in a court of law. What is evidence? I think that the definition which is given to young policemen explains the matter clearly and simply. "Evidence includes all the legal means, exclusive of mere argument, which tend to prove a matter of fact, the truth of which is submitted to judicial investigation". It will be seen that veterinary surgeons can give great assistance to the Courts in matters which come within their province. It is a veterinary surgeon's duty to assist the Courts and the law recognises

* *Resumé of paper of address delivered at Cambridge to the Cambridge Veterinary Society, South Wales Division of the B.V.A., Dumfries and Galloways Division of the B.V.A.*

his authority to do so for, in virtue of his training, he should be able to assist the judicatory towards an appreciation of what is fact and what is conjecture.

I believe that this job gives rise to feelings of anxiety in many young veterinary surgeons of the present day. For some time I took evasive action. This was easy, for my seniors had great joy in "saying" their piece in the Police Courts. Many of them would neglect their practice in order to give a public exhibition of their prowess in the forensic art. The day came when I could not find a deputy, the die was cast and I had to enter the witness box. My mouth was dry and there were butterflies in my stomach. The Stipendary Magistrate must have noticed my timorous state and being a psychologist, as all good magistrates should be, when he came to sum up the case he made a few kindly remarks about the fairness and the manner of my evidence. My trepidations fell away at once. I walked out of that Court filled with a new-found confidence and I did not shirk this type of duty again. I shall be grateful always to that wise and kindly man. A want of confidence can become a fear. Fear may become an obsession and cause the development of a pronounced inferiority complex. Such a state of affairs would have been of serious moment to me, for few days passed without a call to give evidence in Court.

There are a variety of courts which one may be called to attend. I think they can be classified as follows:

1. Courts of Summary Jurisdiction, commonly known as Magistrates' Courts or Police Courts. In some towns this court is conducted by a paid magistrate, sitting alone, i.e. a Stipendary Magistrate. In other cases local magistrates, one of whom functions as Chairman, sit together. Magistrates are addressed as Your Worship or His Worship.

2. County Courts (these deal with civil actions) conducted by a Judge sitting alone. The Judge is addressed as Your Honour or His Honour.

3. High Court, which includes Assizes, etc. The Judge may be assisted by a Jury. High Court Judges are addressed as My Lord.

There is another type of "court" that you may be called to attend. It functions when there is some dispute as to the interpretation of a contract (such as an insurance contract) and in the terms of that contract the signatories agree to submit their case to arbitration. Generally a legal man sits as arbitrator and each side can be represented by Counsel. When the arbitrator is referred to by Counsel he is called the Learned Arbitrator: I don't know how a witness should address the arbitrator other than by 'Yes Sir' or 'No Sir'.

I am advised by a legal friend that at this point I should say a few words about the procedure when you enter a court to give expert evidence. The conduct of the case is not the concern of the expert witness. If possible the legal men do like to see their experts and have a talk before the case is called. They can assess the value of your evidence and plan how and when to use it. Also there may be points which they desire to be explained and these may include the terminology that one has used, for these men do not use medical language customarily.

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It is remarkable how quickly a good advocate can get a reasonable grasp of a subject which has never come his way before. As a rule expert witnesses are allowed to be present in court even before they have given their evidence. Generally it is arranged that the expert should sit near the advocate so that the latter can seek advice or explanation whilst the experts on the other side are giving their evidence. When the time comes to give evidence you go to the witness box, or stand, and take the oath. In some cases this is recited slowly by an official of the court and you repeat his words sentence by sentence. In other cases one is presented with a card on which the words are in large type and you read it without any monitoring. Then the Clerk of the Court makes a record of your name, address and qualifications.

Taking the oath is counted as a very serious matter by the courts and the ceremony should be performed by the witness with the due seriousness and solemnity which befits the occasion. On several occasions I have been present in court when witnesses have been rebuked severely for not taking the oath in a fit and proper manner and on one occasion a High Court Judge made the witness repeat the oath as the Judge dictated the solemn words sentence by sentence.

A witness may take his diary into the witness box in order to refresh his memory on matters such as dates and times, and the remarks which were made in his presence at the time of his examination. A diary which is used in this way can be inspected by the advocates, the Clerk and the Judge. A witness may be asked to examine other documents which are handed to him by the Usher of the Court.

When an expert goes into the witness box he does not go there to make a speech but to answer questions put to him by the advocates on either side, by the Judge or Magistrate or by the Clerk of the Court. If the plaintiff or defendant is conducting his own case then he may put the questions.

You will be examined in the first instance by the advocate appearing for the side which has requested your services. This is called Examination-in-Chief. As a rule this is very plain sailing, for the advocate will pose questions only on those matters on which he has received your previous opinion and advice. Next you will be examined by the opposing advocate. This is called the Cross-examination. It may not be confined to those things which have been put to you during the examination-in-chief. Cross-examination is more severe and searching than examination-in-chief. In the latter most of the questions have been put to you previously by Counsel and he has planned his case on your answers, you have some knowledge of the line he will take and naturally he will pilot you through with ease. In cross-examination the field is uncharted, you have no previous knowledge of the line that Counsel will take, and the main object of his dissection of your evidence is to discredit it or turn it to his client's advantage.

It may be that in cross-examination information is disclosed which is not in the favourable interest of the client by whom you have been called. On such occasions your own advocate may exercise his privilege to re-examine you in an attempt to retrieve the situation or maybe to turn it to his advantage.

Whilst these examinations are going on there may be breaks in the continuity, for the Judge may ask questions to clear up some point or he and the advocates may discuss matters of law. When an expert witness has completed his evidence and left the witness box the court can give him permission to depart.

Having survived the ordeal of my first case and with the kind words of the magistrate ringing in my ears I was filled with confidence and I never shirked the issue again. There was plenty of opportunity to gain further experience. I began to enjoy listening to the legal arguments upon points of law and hearing learned Counsel examine the witnesses. The Stipendary Magistrates and the Judges amazed me because of the apparent ease with which they could get a grasp of a case, sum up the essential facts and give logically sound and just decisions. As my experience was extended by attendance in a variety of courts I began to take note of the manner of the witnesses, the way in which they gave their evidence and how that evidence was received. Soon I was able to distinguish a good witness from a bad one. I recognised that in most instances the evidence of a good witness was accepted whereas that of the bad witness was rejected. It is a joy to listen to a good witness whereas a bad one can bring all in his audience to a state of irritation and confusion.

One day I made a list of the points to guide my conduct in court and make me a good witness.

1. The law recognises that a registered veterinary surgeon is the only person competent to give authoritative opinion on veterinary matters.
2. You must be firmly convinced in your own mind that the evidence which you give is the truth.
3. One should give evidence of fact and avoid conjecture and embellishments. If asked to give an opinion on things of which you have not factual knowledge, that opinion should be one which is founded on accepted fact, theory or personal experience.
4. A veterinary surgeon knows more about veterinary science and practice than a legal man does.
5. Use simple language. Avoid the use of "high falutin" technical or medical terms. Remember that the people you are addressing are not experts in medical phraseology and technology.
6. If possible keep your answers short. "Yes" and "No" are the best replies. The more you talk the more fuel is provided for cross-examination.
7. Speak slowly so that your words can be followed and understood by the listeners. Remember that in most Courts evidence given has to be written down in long-hand. If you speak slowly your mind will remain clear, for thought can keep pace with words. If your words over-run your thoughts you can be in trouble very soon.
8. Give the correct answer even if it may not support the cause of your client. Don't hesitate in this. It stamps you as a truthful and reliable witness and enhances the value of other parts of your evidence which may be very much to the advantage of your client.
9. Don't attempt to answer a question which you do not comprehend fully. If a question is long, don't be afraid to ask for it to be phrased differently or cut up into sections.
10. Beware of the man who asks you to assume certain conditions and then poses questions. Ask to be notified when assumption begins and ends.

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11. Don't lose your temper. When confronted by blustering, noisy Counsel keep calm and don't retaliate. Say that if he moderated his tone it would be to mutual advantage and also to the advantage of the Court.
12. Do not volunteer information or be inveigled into giving opinion on matters in which you are not well-informed or which are not directly within your province, i.e. on chemical matters in poisoning cases. It is proper and fair to say "I am not an expert on this matter and it would be best and in the interest of all concerned if the question was put to one who is expert".
13. Stick to your proof. Before a legal man can advise his client or represent him in Court he must know the evidence on which his client's case rests. He may ask the relevant witnesses for a written report or he may interview them and write down the salient points of the verbal evidence which they present. From these sources of information he will prepare what is called a proof of the evidence which they are prepared to give. The witness will have the opportunity of reading and studying his proof and of making amendments or withdrawing any part of the evidence. Solicitor and Counsel must know what their witness is prepared to say and it is on this knowledge that they plan the conduct of the case. When your proof has been agreed you must stick to it in Court. If you do find that you want to alter or omit anything which is in your signed proof adequate notice must be given to those responsible for the conduct of the case before you enter the witness box. An advocate can be greatly embarassed if a witness, when being examined in chief, diverges grossly from the facts and information which he has furnished previously.
14. From time to time you will be asked to place a value on the animal or animals which are the subject of litigation. This is a relatively easy matter when it concerns the value of an ordinary horse, ox or dog and most people who are in daily contact with these animals can give a reasonable assessment of their probable value. Many animals have a specialist value and that value is not measured by ordinary or common standards. You will be wise if you refuse to put a value on such an animal. In your reply you should state that you are not an authority or expert in this matter and suggest that the question should be referred to an expert valuer. In this you are protected fully by the law, for in 1920 Judge Whitmore Richards ruled "The Veterinary Surgeon was a man employed at a fee for a specific purpose which did not include valuation. He, the Veterinary Surgeon, was not a valuer and the question could not be allowed".

These elementary facts or rules have been my guide for many years and my own experience proves that if you bear them in mind there is no need for undue anxiety, no matter what men of renown assail you whilst you are in the witness box.

Whenever you get the opportunity I would advise that you attend the various Courts of Law. Except in very special circumstances the Courts are open to the public and accommodation is provided at the back or in a gallery. Attendance at Coroners' Courts is also useful. It does not matter if the cases you hear are not concerned with veterinary affairs. By watching and listening you will soon gain a knowledge of procedure and it will not be long before you know what makes a good

or bad witness. If it is possible to attend when medico-legal cases are being dealt with you may be able to hear some of the men who have attained renown as expert witnesses. You will also hear others who are not so good and some who are awful. You will find that the good ones will create a profound impression. You will note that they do not waste words, they use the simplest language possible, they are extremely fair and do not attempt to be too technical, show bias, or attempt to usurp the position of Counsel for prosecution or defence. I had the privilege of hearing the late Sir Bernard Spilsbury give evidence and of studying his demeanour in the witness box. He was the ideal witness. He was always calm and composed, he made great use of the words " Yes " and " No ", he was completely impartial, and in consequence his evidence was accepted as the truth.

Spilbury's colleagues and mentors Sir William Willcox and Dr. Pepper were also great men in the witness box. It was an education to listen to them or even to read the reports of their evidence. These men never exaggerated, their witness was factual, they were brief and completely impartial. They were supreme in the rôle of expert witness and there have been few who could approach their standard. I have seen and heard eminent men, recognised authorities in the particular disciplines in which they were called to bear witness, give such deplorable exhibitions that their evidence was worthless and could be ignored.

I was present in Court when two renowned pathologists were examined. They would not answer " Yes " or " No " to the simplest and most straight-forward questions. Before they made reply they would bury their heads in their hands as if in deep thought. After a long interval a rambling answer would be given, an answer which was not relevant to the question which had been put. Even the Usher of the Court could have given a reasonable reply to some of the questions by the use of the words " Yes " or " No ".

It was obvious to all present in Court that these two men were " playing for their side " and that their testimony was biased and could not be accepted. Their client's case was harmed and they brought discredit upon themselves and their profession.

Some people go into the witness box tensed up and on their guard and obsessed with the idea that Counsel's job is to try and catch them out. Such a state of mind portends trouble. Good Counsel like good examiners do not need to set trap questions.

If you are speaking what you firmly believe to be the truth there is no need to worry, and if by chance you do come against an advocate who may try to achieve his objective by trap or trick questions your client's Counsel or the Bench will soon bring him to heel and protect you.

Concentrate all your attention on the question in hand, don't worry about the things which you anticipate might be the subject of questions two or three ahead.

There will be occasions when clients or solicitors will seek your advice and help and you may find that you are not in agreement with the statements, theories, or submissions on which their case rests. It is your duty to make this known at once. Do not try to mould your views and opinions so that they conform with those of the

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people who consult you. If you attempt to "fit in" then your conscience will trouble you for you will be departing from that which you believe to be the truth. If, whilst in the witness box, you do depart from what you firmly believe to be the truth disaster looms ahead, for one deviation leads to another like a cumulative poison and you will be "easy meat" for the most ordinary advocate. I have seen witnesses, who have slipped up in this way, torn to pieces in cross-examination and leave the box completely discredited and in such a physical and mental state that one could only be sorry for them. If you cannot honestly support a client, tell him or his legal representative at once and say that in your opinion your evidence can be of no value to their case, in fact it may be detrimental.

Quite often you may render great service to your client by acting in this way. His legal advisers may welcome your advice and appreciate that their client has little or no chance of success and they may be able to seek other means of redress or settlement. Now, if such an episode should occur, remember that you have been in this client's confidence, you must respect that confidence and this prohibits you from acting for the "other side". If you are approached by the other side tell them that you cannot assist them for you have been consulted by and are in the confidence of their opponents. It may be that the "other side" will put two and two together and compel your attendance at Court by subpoena. You need not disclose the evidence you intend to give when in the witness box. You can demand your fee to be paid before you take the stand and if you make that fee sufficiently high it may deter them from calling you.

This question of confidence is a sacred thing in all professions and the man who abuses it of his own volition can be subjected to the severest attack by Counsel and rightly so. In one case in which I was involved an eminent veterinary surgeon changed sides. The dressing down he got in Court by a renowned K.C. was terrible.

So far I have tried to give you some idea of how to conduct yourself in the witness box with some reasonable credit and to avoid some of the pitfalls. There is an old saying that one should avoid going to law. This statement applies to the litigants and not to expert witnesses. For litigants it is best if they can settle arguments without recourse to the Courts.

It can be very costly to go to law and often you can serve a client's interests best by encouraging him to try and settle the dispute in a friendly manner and out of court. I can tell of one man, a very decent fellow, who became so obsessed in pursuing a fight for his "rights" in court that he brought his family to ruin, a fortune to his lawyers, and ended up in a mental institution. Of course the expert witness does not have the worries and financial responsibilities of a litigant. He stands at no great risk; he is paid to sit at the ringside and watch the fight. He may be called to add a few words to the general discussion and answer some questions. He will enjoy listening to the cut and thrust of the gladiators who fight with words not swords, he will respect and admire the calm thoughtful demeanour of the umpire, he will see the evidence dissected and sorted so that a just and logical conclusion can be reached.

The panorama of the court procedure is seldom dull and there are times when it is thrilling and exciting. Don't let it get a too big a hold on you so that you fancy yourself as a "Sea Lawyer". Leave the forensic details to the legal men, who are competent to argue questions of law.

In my opinion English law is founded on what the ordinary man calls common-sense and what a reasonable man would consider just and fair.

Before I leave the serious side of this discourse there is one situation which I must bring to your attention. What should one do if asked to give evidence against a member of one's own profession. I have never given such evidence, and I hope that I will never do so. There have been occasions when I have been shocked to hear Veterinary Surgeons doing their utmost to heap trouble and distress upon a professional brother. In these days of free legal aid actions for negligence are becoming a menace to professional men. I have known of several actions which have been brought against Veterinary Surgeons and on very slender evidence. Other Veterinary Surgeons have done their best in the witness box to support the allegations sometimes to such an extent that the witness might be likened to Counsel for the prosecution.

In each of these cases the allegations were proved to be false. Such actions can bring great trouble, distress and financial loss and even ruin to the accused. If the actions are brought under the Legal Aid system and the defendant is exonerated he cannot recover his costs from the Legal Aid Committee. If the defendant loses and costs are awarded against him the law will see that those costs are recovered. Legal Aid cases are an example of "Heads I win, Tails you lose". Veterinary Surgeons who voluntarily assist in such actions against a professional brother should remember that they may be the victim of a similar action tomorrow and in dire need of help.

I take a very serious view of this great hazard and urge you all to join the Defence Society as soon as possible.

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The courts have a serious purpose but the proceedings are not always dry and solemn. Wit and humour bubble to the surface every now and then and help to relieve the tedium and the effects of the hard seats.

A client was a self-made man and an Irishman. It was his usual practice to submit all new horses to an examination for soundness. One day he went to a London auction and returned with three horses. Each had been unnerved. The hooves showed signs that they were about to be shed before the horses had been in his stable for a week. The Irishman was furious and took action against the vendors in the High Court. He was in the witness box and the following conversation took place between the witness and the Judge.

*Judge*: "Now Mr. ——, you are undoubtedly a very clever man and you have raised yourself from the position of labourer to that of an astute businessman and a man of substance." (The client literally swelled with pride). "Why did you buy these miserable horses?"

*Client*: "Sure your honour I bought them for the sake of humanity and the whole human race."

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A sewage poisoning case. To my surprise a country practitioner was answering questions on chemical and bacteriological matters. He was performing exceptionally well under cross examination.

*Counsel*: "Mr. ——, you seem to be very well informed in these matters."
*Witness*: "Yes."
*Counsel*: "Have you been reading them up?"
*Witness*: "Yes."
*Counsel*: "Why?"
*Witness*: "So that I could answer your questions."

A very distinguished veterinary surgeon was giving evidence on behalf of some officials of a Society who were being prosecuted for cruelty. A field of rest was under discussion and to my amazement the D.V.S. had described it in most glowing terms. The field had been a market garden. The business failed and the field had run wild. It was full of docks, weeds, old gooseberry bushes and brambles. Counsel for the prosecution (a farmer) was shocked by the D.V.S.'s evidence for he had inspected the field that very morning. His cross-examination was short. "Mr. ——, you have held very high rank in your profession and you have many years of experience. In all your many years of experience have you ever seen a worse field?"

*Answer*: "In all my many years of experience I have never seen a worse field".

*A Police Court.* Alleged cruelty to a horse. I had been called by the Police. My evidence did not support the allegation of cruelty and the stipendary dismissed the case. Up jumped the elderly veterinary surgeon who was employed by the defence. "Your Worship, you have not heard my evidence". The Stipendary looked at him and said "Mr. . . . are you not satisfied, would you like me to find the charge against your client proved?" I think the Veterinary Surgeon was afraid that he might have difficulty in collecting his fee if he was not called into the witness box.

In a case concerning nutrition of horses a witness had talked about proteins, fats and carbohydrates and been very profound. To my amazement Mr. X., an old friend of mine, who followed the erudite witness in the box also started to talk about P. F. & C. Very naughtily I suggested to Counsel that most probably the witness did not know what a protein was. Counsel in cross-examination said that eminent men of science, such as the witness was, used language far beyond the measure of the comprehension of simple barristers. They could understand only if a food was described as good or bad. The witness flattered by the barrister's words smiled and visibly swelled with pride until—

"Mr. . . . What is a protein?"

There was laughter in court for the poor man was struck dumb and made a sorry spectacle. The loudest laughter came from another veterinary surgeon sitting next to me and who was appearing for the same side as my old friend. Some time afterwards I said that I was surprised that he should laugh so heartily at Mr. X's discomfiture. He replied "I was not laughing at X. I was laughing because Y (a very distinguished V.S. and a PP.R.C.V.S.) who was sitting next to me and was to follow Mr. X in the box was tugging at my sleeve and saying 'For God's sake, tell me what is a protein?'"

Two old veterinary surgeons in London. Number One appeared constantly for the prosecution. He did not stick to the truth always and he was wont to exaggerate in order to get convictions and ensure more employment. Number Two was full of righteous indignation because his clients were the victims all too often. No. 1 always prefaced his evidence by saying he was " veterinary surgeon to this, that and the other important body ". If he had three or four cases in the same court and on the same day he would repeat the formula on each occasion that he entered the witness box.

Old Street Police Court. Veterinary Surgeon No. 2 and I were waiting for our cases to be called, his was called first. Veterinary Surgeon No. 1 went into the box and delivered the formula " I am V.S. to . . ." Veterinary Surgeon No. 2, obviously agitated, stood up in Court and said in a loud voice " and to the Waifs and Strays, the Cats' Home and the Mothers' Union ". This causes a sensation in Court and much laughter. Veterinary surgeon No. 2 was removed out of Court. Later he was brought back and severely admonished by the Magistrate.

Later I said " Mr. . . . your action was very stupid and you are lucky that you got off so lightly ". He replied " I know it was, but for a long time I have wanted to say something to blow old . . .'s gaff and I feel very happy now ".

I remember an occasion at the Law Courts. The action arose because two " gentlewomen " had abused one another in Billingsgate language and eventually come to blows. The altercation was about a dog and its lice. Now the veterinary surgeon who said that lice were present was colour blind and this became known to the opposing Counsel. In his cross-examination the Counsel asked him to describe the colour of these parasites? The poor man got into an awful tangle and the Judge stepped in to ask him " What was a brindle dog, what was a fawn dog?" The tangle got worse, the Judge became very annoyed and his irritation was very evident. The ultimate decision was against the veterinary surgeon's client and I think that it was influenced by the Judge's poor opinion of the competence of the veterinary surgeon.

My brother wore a beard and he looked older than his years. He was appearing at Old Street Court in a case respecting alleged cruelty to a horse. The veterinary surgeon for the prosecution grossly exaggerated the so-called defects. These defects were not apparent to my brother nor to several other V.S.s. who were present and he said so in no uncertain manner and then the following conversation took place.

*Stipendary*: " Mr. McCunn, you will acknowledge that this is an old animal?"
*McCunn*: " Yes, your Worship, but age is not a crime. If it were, your Worship, you and I would have been destroyed years ago ".
*Stipendary*: " Say no more ". He dismissed the case.

Some years ago there were two veterinary surgeons who asserted that cattle could be poisoned by the effluent from sewerage works. Their services were in constant demand in legal actions, for if a farmer lost a few cattle and there was a sewerage plant in the vicinity, sewerage poinsoning was a good horse to ride and there was no doubt that the owners of the plant, Borough or Urban Council, had plenty of money to pay compensation if the plaintiff's plea succeeded.

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The defending barrister was prompted to put the following to the witness.

*Q.* "How do you know that this effluent was poisonous?"
*A.* "Because of the symptoms and the chemist's report".
*Q.* "How did the chemist's report help you to your decision"?
*A.* "Because of the presence of ammoniacal and ferruginous matter".
*Q.* "Do you mean iron and ammonia"?
*A.* "Yes".
*Q.* "Do you ever give these things to cows"?
*A.* "Yes".
*Q.* "To poison them"?
*A.* "No, as medicine".
*Q.* "For beneficial effect"?
*A.* "Yes".
*Q.* "What do you give"?
*A.* "Sulphate of iron and carbonate of ammonia".
*Q.* "How much do you give for beneficial effect"?
*A.* "Two to four ounces".
*Q.* "Does the chemist's report indicate how much iron and ammonia there is per gallon"?
*A.* "Yes".
*Q.* "Is it given as grains per 100 gals."?
*A.* "Yes".

The barrister then said: "Here is some paper and a pencil. Will you please work out, and I will attempt to do so also, how many gallons of the sewerage effluent that a cow would have to consume before she had reached, on your own admission, a minimum beneficial dose of this iron and ammonia".

The two set to work with paper and pencil and the Judge also joined in. The Judge was the first to break the silence by saying "I find that about 400 gallons would have to be consumed per day, and that is ridiculous for it is beyond the capacity of any cow." The farmer lost his case.

In a sewerage case the Judge had asked me questions and I pointed out to him that the effluent from a sewerage plant could do no harm unless it was distasteful or it contained some chemical or bacterial matter which was harmful to the animal. By way of explanation I told him of a Rear Admiral, a mental patient, who had to be closely watched otherwise he would eat his own faeces. This had gone on for years and without causing bodily harm.

*The Judge*: "Did you say that this man was a Rear Admiral"?

*Answer*: "Yes, and a man of distinguished career".

*The Judge*: "I thank God that I did not join the Navy".

Some years ago an old friend and one of my teachers, a professor now dead, and I were on opposite sides. It was alleged that a maid and some children had caught ringworm from a cat which had been purchased at a London store. The maid developed ringworm on the neck, the cat was suspected as the source. The Professor

examined the cat and no evidence of ringworm was found. About 3 weeks later the children developed ringworm and a few days later the cat was examined again. This time the fungus was found on a small spot on the edge of one ear. Counsel for Plaintiff examined me.

*Q.* "Do you know the Professor"?

*A.* "Yes, he taught me".

*Q.* "Is he an expert on these matters"?

*A.* "Yes". (The Professor was obviously pleased by my reply).

*Q.* "You have heard that he found ringworm on the cat"?

*A.* "Yes".

*Q.* "This evidence proves that the cat was the source of the trouble"?

*A.* "No. It appears to suggest exactly the opposite".

*The Judge*: "Please explain".

*A.* "From the dates that have been given the cat was examined shortly after the maid was found to have ringworm and the report was a negative one. The cat was examined again after ringworm had been found on the children. The report was a positive one for a small lesion was found on one ear. I have known my Professor for many years, he taught me and I know that he is a most thorough and competent man. If he did not find ringworm on the cat at the first examination I am confident that the cat was not affected. Later he found ringworm on the cat after the children had been affected. Therefore the only conclusion I can arrive at is that the maid was the original victim and the children and the cat got their infection from her".

The Judge accepted the theory and gave the verdict in favour of the defendants. The Professor was not pleased.

There was a case concerning a T.B. stallion which was insured for £45,000. The plaintiff's Counsel was making a very brilliant and impassioned speech on behalf of this client.

"Mr. . . . loves this horse and cannot bear to think of it being in pain. The question of this miserable £40,000 is of no consequence".

Counsel reiterated this moving plea several times. The plaintiff was sitting next to me and he became more and more agitated. At last he rose, walked round to his Counsel and tugged at his sleeve; Counsel bent down and there was a whispered conversation. Then Counsel with his fervour considerably abated apologised to the Court for a slight mistake he had made. The sum in question was £45,000 not £40,000.

There are occasions when your evidence may need to be qualified by a knowledge of the animal's environment, how it is housed and cared for, the quality and sufficiency of its diet and water supply, the state of the terrain or roads, harness or tack or even of the vehicle to which it had been attached.

It helps a lot if you investigate these things for questions may be put to you and, if they are, your replies can be based on fact and not on conjecture. I have known of eminent Counsel who always visit the site so that they have personal knowledge of environmental conditions. I have found such knowledge most useful. On one occasion

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it was alleged that it was cruel to let a lion ride on a "Wall of Death". The lion was in excellent condition and seemed to enjoy his ride and he was most anxious to take his seat as soon as the motor started up. I placed myself in the lion's seat and went through the performance. It was quite thrilling and like the lion I enjoyed it. My experience helped me to make some estimation of a sentient being's reactions. It evidently impressed the Stipendary for the case was dismissed with costs.

I could go on and on relating incidents such as these. You will see that Court work is most intriguing for it has its serious and humorous sides. I have left many things unsaid but I hope I have said enough to provoke a discussion from which both you and I may profit.

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EVAN W. P. THOMAS, LL.B., *Solicitor, Neath.*

As a practising solicitor and advocate it was with great interest that I heard Professor McCunn deliver his paper "Veterinary Surgeons in the Witness Box" and was pleased to be asked to comment thereon and to open the discussion that followed.

It was an illuminating experience for me to view Court procedure from the eyes of those usually on the other side of the fence and I was most impressed, not only with the manner of delivery but with the very sound common sense shown by the Lecturer and by the content of his remarks.

It is a salutary lesson to the advocate to be reminded that witnesses are likely to be nervous and that, in such circumstances, even a clever man knowing his subject well, can appear to be a mumbling fool. So much so that I thoroughly agree with Professor McCunn that a little time spent in the Courts seeing what goes on is well worth while, even if only to give confidence to the aspiring witness and thus enable him to do himself justice.

I was particularly impressed with the fourteen points listed by the Professor as being a guide to his conduct in Court and which, in his opinion, were necessary to make one a good witness. With these I thoroughly agree, although I would qualify points 5, 6 and 7 to a slight extent in that it might be necessary on occasion to avoid a simple affirmative or negative so that a half-truth does not emerge and occasionally an answer needs qualifying in the light of circumstances. For the Veterinary Surgeon, as in the case of all expert witnesses, point 8 is of paramount importance and cannot be emphasized too strongly. With the remaining points I am in complete agreement. I would, in all humility, add a fifteenth point and urge upon those members of the profession likely to give evidence that they should be neatly dressed whilst in Court. Not only is this important from the point of view of the prestige of the profession which he represents, but a "scruffy" witness is not as likely to give an impression of being fully master of his subject as one neatly dressed.

On the morning I had the privilege of listening to Professor McCunn I had read a medical report on a client of mine, which contained, *inter alia*, the following: Crepitation of the patella; Chrondromalacia of the patella; Femoral condyles; Inter-

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malleolar separation. All this was so much "Greek" to me, particularly as on enquiry I found my client was suffering from a rheumatic condition of the knee. I mention this to emphasize the point made by Professor McCunn on the avoidance of the use of excessively technical language.

I think the importance attached to the giving of an honest opinion, even if this be against the interests of your client, cannot be too heavily emphasized. Those instructing you do not want a favourable answer, they want an honest one. Should the "other side" subpoena you in order to compel your attendance, not only can you demand that your fee be paid beforehand, but you need not let them know what it is you propose to say when questioned and, in these circumstances, it is highly unlikely that Counsel will take the risk of laying his own side open to evidence which, insofar as he knows, may well be to the disadvantage of his clients.

I conclude by saying again how much I enjoyed Professor McCunn's personal reminiscences; these indicate how very wide his experience have been, and suggest that a sense of humour is not always incompatible with erudition.

## *REVIEW*

LA METHODE DES INDICATEURS NUCLEAIRES DANS L'ETUDE DES TRANSPORTS ACTIFS D'IONS. 1er Colloque de Biologie de Saclay (3 & 4 juillet 1958) organisé par le Service de Biologie du Commissariat à l'Energie Atomique dans le centre de l'Institut National des Sciences et Techniques Nucléaires. Pergamon Press, 1959, Paris, London, New York, Los Angeles. IX + 196. 3,000 Frs. 60/-.

The title of this book is a little misleading as the authors are more concerned with the problems of active ion transport itself than with illustrating the use of isotopic tracers. The book brings together various views on the transport of Na and K; the redox theory; the interrelation of Na and K movements; the sodium potassium pump; the role of polysaccharides and endocrines. It covers the behaviour of ions within a variety of tissues including yeast cells, nerve fibres, muscle cells and in the proximal tubules. Both thermodynamic and biophysical treatments are well displayed. Although much of the material has appeared before, in one guise or another, there is much that is new, and the reader will find that this collection of up-to-date information and arguments is more than useful and stimulating.

On the debit side, it is a pity that more attention has not been given to the other electrolytes and non-electrolytes. However, this is really only asking for more of an excellent book which should be indispensable to the student of active ion transport.

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## *NEWS*

### FOOT-AND-MOUTH DISEASE — AN ADDITIONAL SAFEGUARD

As from 13th December, 1959, every consignment of meat and edible offal imported into Great Britain from the Argentine, Brazil, Chile and Uruguay will have to be certified by an authorised officer of the Government of the country of origin as having come from approved frigorificos (combined slaughtering and meat freezing plants). This is a further precaution taken by the Minister of Agriculture, Fisheries and Food and the Secretary of State for Scotland to prevent foot-and-mouth disease being brought into this country.

Frigorificos approved by the Ministry are already regularly inspected by British veterinary officers stationed in South America.

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### EDUCATIONAL AWARDS

The following *Animal Health Trust Educational Awards* for the period 1959/60 have been announced:

**Wellcome Fellowships**

Mr. P. H. Lamont, B.Sc., M.R.C.V.S., (Senior Wellcome Fellowship), to undertake investigation of enteroviruses of the pig, and their possible role in disease, at the Department of Animal Pathology, Cambridge, under Prof. W. I. Beveridge.

Mr. I. R. Falconer, B.Sc., to study thyroid-ovarian-pituitary interrelationship at the Department of Biological Chemistry, University of Aberdeen, under Dr. H. A. Robertson.

**Vitamealo Fellowship**

This new award was founded to commemorate the 70th birthday of Lord Rank and his close association with Vitamins Limited, by whom it was donated. The first recipient is Mr. D. B. Ross, B.A., Vet.M.B., M.R.C.V.S., who is to continue work on some of the more fundamental aspects of magnesium metabolism, particularly intestinal absorption. Initially Mr. Ross will work at the Department of Animal Pathology, Cambridge.

**Research Training Scholarship**

Mr. W. A. G. Charleston, M.R.C.V.S., to undertake an investigation into the mechanics of the quadrupedal vertebral column, with special reference to the dog and the cat, under Prof. Ottaway at the Department of Veterinary Anatomy, University of Bristol.

**Evans Final Year Scholarships**

*Royal Veterinary College, London*: A. R. Hopkins, R.V.C. Field Station, N. Mimms, Herts. (Nominated, February, 1959).

*Glasgow Veterinary School*: K. C. Calder, Jamaica, B.W.I.

*Bristol University*: M. D. Peace, The Grove, Woodland Lane, Fillongley, nr. Coventry.

*Liverpool University*: Jointly between Kwame Obeng Gyening, 2 Prince's Ave., Liverpool 8, and David Walker, 37 Wallace Rd., Loughborough, Leics.

*Cambridge University*: Brian Loveday, 34 Gilbert Road, Cambridge.

*Royal (Dick) School of Veterinary Studies, Edinburgh*: N. T. Middleton, 5 Thorn Road, Bramhall, Cheshire.

*Veterinary College of Ireland*: Francis H. Austin, The Ward, Co. Dublin, Eire.

*21st August, 1959.*

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## PARKE, DAVIS & COMPANY

Another expansion activity of Parke, Davis & Company, is taking place in Mittagong, Australia, with a new building devoted to veterinary Research.

Because the animal industry represents a major share of Australia's economy, most of the laboratory's experiments will be aimed at eradication of parasites in sheep and other animals.

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## AREA ERADICATION PLAN FOR TUBERCULOSIS

Orders made by the Minister of Agriculture, Fisheries and Food and by the Secretary of State for Scotland will declare as attested areas on 1st October the whole of Wales and Scotland and certain parts of England.

The areas affected by the Orders are :—

(a) Bedfordshire, Cambridgeshire (excluding the Isle of Ely), Essex, Gloucestershire, Herefordshire, Hertfordshire, London, Middlesex, Norfolk, Shropshire, Suffolk, Worcestershire and parts of Buckinghamshire, Northamptonshire, Oxfordshire and Warwickshire.
(b) Cornwall and West Devonshire.
(c) Parts of Durham and of the North and West Ridings of Yorkshire.
(d) Flintshire, Monmouthshire and parts of Denbighshire and Glamorganshire.
(e) Aberdeenshire, Angus, Kincardineshire and part of Banffshire.

With the declaration of an Attested Area the control by licence of cattle movements *within* the area is relaxed; but prohibition of the movement of cattle *into* it,

except under licence, continues, save for certain transit journeys directly through the area. Permits or licences are not required for movements of cattle between farm premises *within* an Attested Area unless either farm is subject to a notice prohibiting movement on or off.

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## ROYAL SOCIETY OF HEALTH FORTHCOMING EVENTS

In the National Museum of Wales, Cardiff, at 10.00 a.m., Wednesday, 25th November, 1959, a paper on "The Control of Slaughtering and Slaughterhouses" by Mr. J. H. M. Hughes, M.R.C.V.S., D.V.S.M., Veterinary Officer, Cardiff.

At the Society's Headquarters at 2.30 p.m., Wednesday, 16th December, 1959, "The Breeding and Feeding of Animals for Human Food" by Dr. John Hammond, C.B.E., Emeritus Reader in Agricultural Physiology, School of Agriculture, University of Cambridge.

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## *ERRATUM*

August issue, page 282, Table I, heading of 3rd column—$\mu$ sign omitted; should read $\mu$ moles—SH/100 ml.

August issue, page 282, line 6 of discussion—ref. to Denis should read (1921) instead of (1821).

On page 291 of the August issue of this journal, paragraph 5, line 4, the word "antibodies" should read "antibiotics".

In the bibliographical details at the heading of the review "Fungal Diseases of Animals", published in the August 1959 issue of this journal, the date of publication is given as 1957 whereas it should have been 1959.

September issue, page 311, the third paragraph of Methods and Materials, line 3, should read—"(100,000 units)" and not "(1,000,000 units)".

September issue, page 315, line 3, should read—"Closely limited biological conditions" and not "closely allied biological conditions".

On page 354 of the September issue of this journal, paragraph 3, line 9, the words "vibonucleic" and "vibonuclease" should read "ribonucleic" and "ribonuclease".

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## Publisher's Notices

THE BRITISH VETERINARY JOURNAL, with which is incorporated THE VETERINARY JOURNAL, is published monthly, and copy for advertisements should be in the hands of the advertisement manager not later than the 20th of the preceding month, if proof is required. Tel.: Temple Bar 3386, 7, 8 & 9.

Letters for the Journal, literary contributions, reports, notices, books for review, exchanges, new instruments or materials, and all matter for publication (except advertisements) should be addressed to the Editor.

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